

SHOE WITH LIGHT AND SOUND ACTIVATED MANUALLY
AND AUTOMATICALLY

5

Field of the Invention

This invention relates to articles of footwear, and, more particularly, to a shoe having an array of light sources such as LEDs and a loudspeaker which are independently activated by an inertia switch and one or more manual switches associated with indicia
10 carried on the shoe or on the manual switches.

Background of the Invention

For a number of years, articles of footwear and various items of clothing have been sold with decorative arrays of light
15 sources such as light emitting diodes (LEDs) and/or a loudspeaker capable of producing a sound. This has been particularly popular in children's shoes where the LEDs are arranged to complement other design elements of the shoe such as cartoon characters and the like.

In a typical design of a children's shoe of the type noted
20 above, a module including a plastic housing is placed in a cavity usually formed in the heel area of the shoe. The module mounts a battery, a switch and, conventionally, an integrated circuit which is

connected by wires to LEDs positioned along the outsole, upper or tongue of the shoe. The integrated circuit may also be capable of generating a signal which operates a loudspeaker, typically mounted in the upper or tongue of the shoe in the general area of the LEDs.

5 Systems of this type are shown, for example, in U.S. Patents Nos. 6,525,487; 6,286,975; 6,012,822; 5,969,479; 5,894,201; 5,812,063 and others.

The integrated circuits employed in modules for children's shoes and other applications are activated by one or more
10 switches carried on or otherwise coupled to the module. In some designs, the switch turns on and off in response to the application of an inertial force, pressure or motion. Spring switches such as disclosed in U.S. Patent Nos. RE37,220 and 5,909,088 are a popular choice for children's shoes because they are reliable, noiseless and
15 movable from a neutral or off position to a closed or on position in response to walking, running or other motion of the shoe. Pressure switches such as shown in U.S. Patent Nos. 5,159,768; 5,649,376; 5,855,080 and 5,714,706 are also employed and they operate in response to the application of a weight, e.g. when the shoe makes
20 contact with a surface.

Another type of switch employed in children's shoes and similar applications is a manually activated switch such as shown in U.S. Patent Nos. 5,894,686; 6,278,378 and 5,813,148. Manual

switches are used to turn on and off the light source carried by the shoe, to select different modes of operation for the integrated circuit associated with the shoe, e.g. different flashing sequences or other operations, and for other purposes. Some systems, such as disclosed
5 in the 5,813,148 patent, employ both manual and inertial switches to activate light sources and/or sound sources associated with the shoe. In the '148 system, the manual switch turns on and off a light source, and also causes a controller including an integrated circuit to activate a particular mode of operation. One of the modes of operation enables
10 an inertia or pressure sensitive switch, which then operates to activate the light source in a selected flashing sequence.

Summary of the Invention

This invention is directed to an article of footwear having both one or more light sources such as LEDs, and a
15 loudspeaker, which are activated either by a manual switch or an inertia switch. Indicia mounted to the shoe, or to the manual switches carried by the shoe, correspond to the sounds produced by the loudspeaker.

One aspect of this invention is predicated on the concept
20 of providing an interactive shoe for younger children which helps teach them numbers, shapes, colors or other designs. Additionally, an array of LEDs mounted to the upper of the shoe illuminate in a

flashing sequence when the child walks thus providing a decorative element to the shoe.

In each of the presently preferred embodiments, an array of LEDs is mounted in a decorative pattern on the upper of the shoe. An electrical circuit including a controller in the form of an integrated circuit (IC) is operative to illuminate these LEDs in a flashing sequence. The IC is activated by a spring switch which operates in response to the application of an inertial force, created such as when a child walks in the shoe.

10 The interactive aspect of the shoe of this invention operates independently of the spring switch. In one embodiment, different indicia, each in the form of a patch of material marked with a number, are mounted to the upper of the shoe over a separate manual switch connected to an IC associated with the controller.

15 This IC may be different from the one which operates the LEDs in a flashing sequence, or one IC which performs both functions may be used. For example, three patches having the numbers one, two and three may be provided, each overlying a separate manual switch in the upper of the shoe. When the child presses on the patch bearing

20 the number "1," the manual switch underneath that patch sends a signal to the second IC which causes the loudspeaker to produce the sound for the number "1." The same is true for the other numbers,

and there may be essentially any combination of numbers employed on the shoe.

In an alternative embodiment, the patches of material mounted to the shoe are of a different color, design or shape. When a
5 child presses one of the patches, for example one having a red color, the manual switch underneath that patch sends a signal causing the IC to operate the loudspeaker so that the sound for the color "red" is produced. Similarly, if one of the patches is formed in the shape of a star, for example, the sound for the term "star" would be made by the
10 loudspeaker by depressing the manual switch underlying the star-shaped patch. The interactive aspect of this invention therefore assists the child in learning his or her numbers, colors, shapes or other designs while adding an element of fun to the shoe.

In a still further embodiment of this invention, a second
15 array of LEDs is provided separate from the first group of LEDs. This second group of LEDs is activated by a manual switch connected to a second IC (or a single IC performing dual functions) which is effective to illuminate the LEDs in different sequences depending upon how many times the manual switch is operated. For example, if
20 the manual switch is pressed a first time the LEDs will illuminate in one sequence, and then when the manual switch is activated again the LEDs operate in a different sequence.

Description of the Drawings

The structure, operation and advantages of the presently preferred embodiment of this invention will become further apparent upon consideration of the following description, taken in conjunction
5 with the accompanying drawings, wherein:

Fig. 1 is a perspective view of a shoe having a module which is connected to an array of LEDs and to a loudspeaker both mounted to the upper of the shoe;

Fig. 2 is a plan view of one embodiment of the upper of
10 Fig. 1 in which indicia bearing a number cover manual switches mounted to the upper;

Fig. 3 is a plan view similar to Fig. 2 except where the indicia have a different shape;

Fig. 4 is a schematic circuit diagram of one embodiment
15 of the electrical circuit associated with the embodiment of Figs. 1-3 including one set of LEDs, a loudspeaker and two ICs;

Fig. 5 is a circuit diagram similar to Fig. 4 except with only one IC instead of two;

Fig. 6 is a plan view of an alternative embodiment of this
20 invention which is similar to Fig. 2 except with two sets of LEDs instead of only one set;

Fig. 7 is a schematic circuit diagram of an alternative embodiment of the electrical circuit of this invention associated with the shoe of Fig. 6 including two sets of LEDs and two ICs; and

Fig. 8 is a view of an electrical circuit similar to Fig. 7
5 except with one IC instead of two.

Detailed Description of the Invention

Referring initially to Figs. 1-5, a shoe 10 is shown having an outsole 12 connected to an upper 14 including a tongue 16. It should be understood that any other article of footwear is considered
10 within the scope of this invention, and the shoe 10 is shown for purposes of illustration. As such, the term "upper" is meant to broadly encompass essentially any shoe element mounted to the outsole of an article of footwear such as the straps of a sandal, etc.

A module 18 having a housing 19 preferably made of
15 plastic is mounted in the heel 20 of the shoe 10. A cavity (not shown) is hollowed out of the heel 20 to receive the module 18, over which the sock liner or insole of the shoe 10 is secured. As schematically illustrated in Fig. 1, the module 18 is connected by wires 22 to an array of LEDs 24 mounted to the upper 14 of the shoe 10, and by a
20 wire 26 to a loudspeaker 28 also carried by the upper 14. The particular location or arrangement of the LEDs 24 on the shoe 10 is a matter of choice, and it is contemplated they could be placed on the outsole 12, tongue 16 and in essentially any other position on the shoe

10. The loudspeaker 28 is preferably mounted to the tongue 16 or some area of the upper 14, rather than on the outsole 12.

Three manually operated, push button switches 30, 32 and 34 are mounted to the upper 14 and connected by wires (not shown) to the module 18. In the embodiment of Fig. 2, each switch 30-34 is hidden from view by a patch 36, 38 and 40, respectively, having an indicia on its exposed surface. These patches 36-40 are formed of a section of material such as cloth, plastic or the like. As shown in Fig. 2, an indicia appears on each of the patches 36-40 in the form of a number, e.g., the number "1" on patch 36, the number "2" on patch 38 and the number "3" on patch 40.

Fig. 3 illustrates an alternative embodiment of this invention which is similar to that of Fig. 2, except it includes patches 42, 44 and 46 having indicia other than numbers. Such indicia may be a different color for each patch 42-46, e.g. red, green and yellow, or it may be a different shape such as a star, square, circle, triangle etc. For purposes of illustration, the patches 42, 44 and 46 are shown having indicia in the shape of a circle, star and triangle, respectively. It should be understood that other shapes, designs and selected colors may be employed as indicia on the patches 36-40 or 42-46, and are considered within the scope of this invention.

Referring now to Fig. 4, an electrical circuit 48 is schematically depicted which includes a battery 50, a spring switch

52, a lighting integrated circuit (IC) 54 (IC 1), a sound integrated circuit 56 (IC 2), the LEDs 24, loudspeaker 28 and the manual, push button switches 30-34. For purposes of the present discussion, the two ICs 54 and 56 are considered a "controller." The battery 50, ICs
5 54, 56 and spring switch 52 are preferably mounted on the module 18. The wire 26 connects the sound IC 56 to the loudspeaker 28, wires 35 connect the push button switches 30-34 to the sound IC 56 and the wires 22 connect the lighting IC 54 to the LEDs 24.

In one presently preferred embodiment, the spring
10 switch 52 is connected by a line 58 to the lighting IC 54, which, in turn, is connected by line 60 to the battery 50. As noted above, wires 22 connect the lighting IC 54 with the LEDs 24, which, in turn, are connected via line 62 to the battery 50. Each of the push button switches 28-32 is connected by a line 64 to one terminal of the battery
15 50 and the sound IC 56 is connected by a line 66 to the opposite terminal of the battery 60.

Fig. 5 depicts an alternative electrical circuit 67 employed with the embodiments of Figs. 1-3 which is similar to the circuit of Fig. 4 except only one integrated circuit or controller is used
20 instead of two. The same reference numbers are used to identify circuit elements common to Figs. 4 and 5. The spring switch 52 and push button switches 30-34 are connected by lines 68 to an IC 70 which controls the operation of the LEDs 24 and the loudspeaker 28.

The switches 52 and 30-34 are connected by a line 72 to one terminal of battery 50, and the IC 70 is connected by a line 74 to the opposite terminal of battery 50.

The detailed construction of the spring switch 52, lighting IC 54, sound IC 56 and IC 70 forms no part of this invention and is therefore not discussed herein. Each of these elements is known in the art and commercially available. One type of spring switch 52 suitable for use in the module 18 is disclosed in U.S. Patent No. 5,408,764. The sound IC 56 is available under part number 66391, and the lighting IC 52 is available under part number 6608, both from Cheerine Development (Hong Kong) Ltd., having a place of business at Room 1217, North Tower, Concordia Plaza, No. 1 Science Museum Road, Tsim Sha Tsui East, Kowloon, Hong Kong.

Operation of Figs. 1-5

The shoe 10 shown in Figs. 1-5 operates as follows. The spring switch 52 is connected between one terminal of the battery 50 and the lighting IC 54, which, in turn, connects to the other battery terminal through line 60. In response to the application of an inertial force or motion to the spring switch 52, it operates to electrically connect the battery 50 with the lighting IC 54. This activates the lighting IC 54 which is effective to illuminate the LEDs 24 connected thereto in a particular flashing or other lighting sequence.

The manual, push button switches 30, 32 and 34 operate independently of the spring switch 52. As noted above, the switches 30-34 are mounted to the upper 14 of the shoe 10 beneath patches 36-40 or patches 42-46, respectively. In the embodiment of Fig. 2, the patches 36-40 bear an indicia in the form of numbers, e.g. "1," "2" and "3," while in the embodiment of Fig. 3 the patches 42-46 are formed of different shapes or other indicia. The sound IC 56 is operative to receive a signal from one of the switches 30-34, and cause the loudspeaker 28 to produce a sound corresponding to the indicia on one of the patches 36-40 or 42-46 which overlies that switch. For example, if a child depresses the push button switch 30 beneath the patch 36 marked with the number "1," the sound IC 56 is operative to cause the loudspeaker to make the sound for the number "1." Similarly, if a child depresses the push button switch 30 beneath the patch 44 in Fig. 3, the loudspeaker 28 is operated by the sound IC 56 to sound the word "star" corresponding to the shape of the patch 44.

The electrical circuit 67 depicted in Fig. 5 operates in the same manner as circuit 48 of Fig. 3, except it employs a single IC 70 or controller which performs the combined functions of the lighting IC 54 and sound IC 56 described above. The LEDs 24 are operated in response to opening and closing of the spring switch 52, and the loudspeaker 28 is activated by depressing one of the push button

switches 30-34 to produce a sound corresponding to the indicia on the patches 36-40 or 42-46.

In each of the embodiments of Figs. 1-5, using either the circuit 48 or 67, the shoe 10 of this invention combines a decorative array of
5 LEDs 24 with an educational aspect which is fun for a child wearing the shoe 10. By causing a sound to be produced corresponding to the indicia on the patches 36-40 or 42-46, the child is assisted in learning number, shapes, colors and the like. The LEDs 24 illuminate in a flashing or other lighting sequence when the child walks, and the
10 shoe 10 "talks to" the child in an interactive manner when he or she depresses one of the push buttons 30-34 as described above.

Embodiment of Figs. 6-8

Referring now to Figs. 6-8, an alternative embodiment of the shoe 10 of this invention is shown wherein the loudspeaker 28 is
15 eliminated and two sets of LEDs 24 and 24' are employed instead of one as in Figs. 1-5. Structure which is common to Figs. 1-5 and 6-8 is given the same reference numbers in all views.

The shoe 10 of Figs. 6-8 includes an array of LEDs 24 mounted to the upper 14 which are activated by a spring switch 52, and a
20 second array of LEDs 24' which are activated by single manual, push button switch 76 operative independently of the spring switch 52. Preferably, the push button switch 76 is covered by a decorative patch 78 mounted to the upper 14 of the shoe 10.

One embodiment of an electrical circuit 80 which causes the LEDs 24 to illuminate is schematically depicted in Fig. 7. The same lighting IC 54 used in the embodiment of Fig. 4 is employed in the circuit of Fig. 7. The lighting IC 54 is connected to the battery 50,
5 spring switch 52 and the array LEDs 24 in the same manner as shown in Fig. 4 and described above. This portion of the circuit 80 operates in the same way as the corresponding part of Fig. 4 to illuminate the LEDs 24 in a flashing or other lighting sequence in response to the application of an inertial force, motion or the like to
10 the shoe 10, and, hence, the spring switch 52.

A second lighting IC 82 is connected by a line 84 to the manual push button switch 76, and to each of the LEDs 24' in the second array via lines 86. The second lighting IC 82 is connected by line 88 to the opposite terminal of battery 50. The lighting IC 54 and
15 lighting IC 82 are collectively considered a controller in that they operate the arrays of LEDs 24 and 24'.

In response to depressing the manual switch 76, the second lighting IC 82 operates to illuminate the second array 75 of LEDs 24 in a predetermined sequence, depending on how many times the
20 switch 76 is pushed. For example, in one sequence of operation, pushing the switch 76 once causes one LED 24' in the second array to flash three times, two LEDs 24' flash three times when the switch 76 is pressed again, and all three LEDs 24' flash three times when the

switch 76 is pressed for the third time. Essentially any other combination of lighting sequences of the LEDs 24' could be employed so long as they operate in response to manual activation of the push button switch 76.

5 Fig. 8 depicts a circuit 90 which operates in the same fashion as the circuit 80 of Fig. 7 as described above, except it employs a single IC 92 instead of two separate ICs 54 and 82. The first array of LEDs 24 are illuminated by the IC 86 in response to operation of the spring switch 52, whereas the IC 86 causes the second array of LEDs
10 24' to illuminate as described above upon receipt of a signal from the manual switch 76.

While the invention has been described with reference to a preferred embodiment, it should be understood by those skilled in the art that various changes may be made and equivalents
15 substituted for elements thereof without departing from the scope of the invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the essential scope thereof.

For example, each of the embodiments shown in Figs. 1-
20 5 depict switches 30, 32 and 34 mounted to the upper 14 of the shoe 10 beneath a patch 36-40 or 42-46 bearing an indicia. Alternatively, the switches 30-34 may be provided with an exposed surface bearing an indicia, thus eliminating the need for a patch.

Therefore, it is intended that the invention not be limited to the particular embodiment disclosed as the best mode contemplated for carrying out this invention, but that the invention will include all embodiments falling within the scope of the appended
5 claims.

I claim: